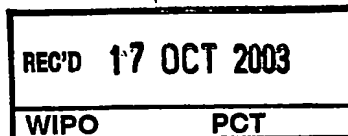




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NP10 8QQ

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1/77
020CT02-ET52579-3 D00589
P01/7700 0.00-0222732.0

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The Patent Office

Cardiff Road
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1. Your reference

P16870GB - NHF/ns

2. Patent application number

(The Patent Office will fill in this part)

01 OCT 1981

0222732.0

3. Full name, address and postcode of the or of each applicant (*underline all surnames*)

Autoliv Development AB
Patent Department Sweden
S-447 83 VARGARDA
Sweden

Patents ADP number (*if you know it*)

321018006

If the applicant is a corporate body, give the country/state of its incorporation

Sweden

4. Title of the invention

Improvements in or relating to an Air-Bag

5. Name of your agent (*if you have one*)

Forrester Ketley & Co.

"Address for service" in the United Kingdom to which all correspondence should be sent (*including the postcode*)

Forrester House
52 Bounds Green Road
London
N11 2EY

Patents ADP number (*if you know it*)

133001

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Country

Priority application number
(*if you know it*)

Date of filing
(*day / month / year*)

7. If this application is divided or otherwise derived from an earlier UK application, give the number and the filing date of the earlier application

Number of earlier application

Date of filing
(*day / month / year*)

8. Is a statement of inventorship and of right to grant of a patent required in support of this request? (*Answer 'Yes' if*

a) *any applicant named in part 3 is not an inventor, or*

b) *there is an inventor who is not named as an applicant, or*

c) *any named applicant is a corporate body.*

See note (d))

Patents Form 1/77

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| Description | 9 |
| Claim(s) | 3 |
| Abstract | 1 |
| Drawing(s) | 3 + 7 |

10. If you are also filing any of the following, state how many against each item.

Priority documents

Translations of priority documents

Statement of inventorship and right to grant of a patent (Patents Form 7/77)

Request for preliminary examination and search (Patents Form 9/77) X

Request for substantive examination (Patents Form 10/77)

Any other documents (please specify)

11.

We request the grant of a patent on the basis of this application.

Forrester Ketley & Co.
Signature

Date
30 September 2002

Forrester Ketley & Co.

12. Name and daytime telephone number of person to contact in the United Kingdom

FRANKLAND, Nigel H.
(020) 8889 6622

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PATENTS ACT 1977

P16870GB - NHF/SJP/ns

5 DESCRIPTION OF INVENTION

"IMPROVEMENTS IN OR RELATING TO AN AIR-BAG"

10

THE PRESENT INVENTION relates to an air-bag, and more particularly relates to an air-bag of the type in which an inner gas supply tube is provided within the air-bag, the gas supply tube being adapted to be connected to a gas generator, and having apertures formed in the wall thereof to direct gas into
15 discrete inflatable regions or chambers formed within the air-bag.

It has been proposed to provide an air-bag which has a plurality of inflatable regions or chambers which are to be supplied with gas from a gas generator. One example of such an air-bag is a so-called "inflatable curtain"
20 which is adapted to be mounted in the roof of the vehicle above the door openings of the vehicle, and is also adapted, when an accident occurs, to be deployed to lie adjacent the window openings formed in the door, thus forming a protective curtain located between the occupant of the vehicle and the side of the vehicle. Such inflatable curtains provide protection to the occupant of the
25 vehicle in the event of a side impact or roll-over situation.

US-6,199,898 B discloses a safety device of this type in which the inflatable curtain is formed of an inflatable element which is divided into a plurality of regions or chambers which are to be inflated. An internal fabric gas

supply duct is provided. That gas supply duct is provided, along its length, with circular apertures formed in the wall of the duct through which gas can flow from the duct into those regions or chambers of the inflatable element which are to be inflated.

5

It is conventional for the main fabric parts of the air-bag, and also the internal gas supply duct, to be cut-out from a large sheet or roll of fabric in such a way that maximum use is made of the fabric so that there is minimum wastage. The internal fabric gas supply duct is normally formed by taking an elongate strip of fabric and folding it so that the opposed edges are brought together, those opposed edges being inserted between the adjacent edges of the layers of fabric which form the main part of the inflatable curtain. The four super-imposed edges are stitched together.

15

Depending upon the cutting-out pattern used for cutting the main fabric parts of the air-bag and the supply duct from the sheet or roll of fabric, the axis of the gas supply duct may effectively make any angle with the warp and weft yarns of the fabric. The axis of the fabric element forming the gas supply duct may, for example, be aligned with either the warp yarns or the weft yarns. In such a case it has been found that the textile "tube" that constitutes the gas supply duct may be almost non-flexible in a radial direction. Consequently the edges of the circular apertures formed in the gas supply duct may "tear" during the inflation process. This may cause an irregular deployment of the inflatable curtain.

25

If the axis of the element that forms the gas supply duct is such that the warp and weft yarns each make an angle of, say, 45° to the axis, the resultant "tube" may be quite flexible in the radial direction. However, during inflation, the region of fabric around the outlets may deform or may become very

substantially "frayed" or with some of the fibres forming the fabric extending into the regions or chambers which are to be inflated. If the internal gas supply duct is not located in exactly the correct position within the inflatable curtain, this deformation of the region around the apertures may be blocked, for example by the dividing seam between two adjacent regions or chambers. Again, in this case, the deployment of the inflatable curtain may be irregular.

The present invention seeks to provide an improved air-bag .

10 According to the present invention, there is provided an air-bag, the air-bag defining at least one inflatable region, the air-bag being provided with a gas supply duct extending into the air-bag, the gas supply duct being formed of a flexible material and being provided with at least one aperture therein through which gas may flow into the said at least one inflatable region of the air-bag, 15 the said at least one aperture being provided with a reinforcement reinforcing the periphery of the aperture.

Conveniently the flexible material comprises fabric or a plastic material.

20 Preferably the gas supply duct is of an elongate form.

Advantageously the gas supply duct is provided with a plurality of said apertures, each aperture being associated with a reinforcement.

25 Conveniently the or each aperture is provided with a respective reinforcement.

Preferably the or each of the reinforcement is stitching provided in the fabric forming the gas supply duct.

Advantageously the reinforcement for the or each aperture is a respective annular reinforcing element.

5 Conveniently the reinforcement is a single reinforcing element defining a plurality of apertures.

Preferably the or each reinforcing element is adhered to the fabric.

10 Advantageously the or each of the reinforcing element is formed of fabric.

Conveniently the air-bag defines a plurality of inflatable regions or chambers.

15

Preferably the air-bag is an inflatable curtain, the gas supply duct being positioned to supply gas to each of the inflatable regions or chambers.

In order that the invention may be more readily understood, and so that
20 further features thereof may be appreciated, embodiments of the invention will now be described, by way of example, with reference to the accompanying drawings in which:

Figure 1 is a diagrammatic side view of an air-bag in accordance with
25 the invention without illustrating the reinforcement.

Figure 2 is a sectional view taken on the line II-II of Figure 1, showing the air-bag in an inflated condition.

Figure 3 is a side view and an underneath view of the gas supply duct of the air-bag of Figure 1, again without showing the reinforcement.

5 Figure 3a is an enlarged view of part of the gas duct of Figure 3 illustrating the yarn orientation in one embodiment of the invention.

Figure 3b is a view corresponding to Figure 3a illustrating the yarn orientation in an alternative embodiment of the invention.

10

Figure 4 is a view corresponding to Figure 3 showing one embodiment of a gas supply duct with reinforcement.

15 Figure 5 is a view corresponding to Figure 4 showing an alternative form of gas supply duct with reinforcement.

Figure 6 is a further view corresponding to Figure 4 showing yet another form of gas supply duct with reinforcement.

20 Turning initially to Figures 1 to 3, an air-bag in accordance with the present invention is illustrated in the form of a so-called inflatable curtain 10. The inflatable curtain 10 is formed from two super-imposed layers of fabric 11, 12, of similar outer shape. The layers of fabric 11,12 are interconnected by means of seams 13 which define inflatable regions 14, 15, 16. One of these
25 inflatable regions 14 is sub-divided into inflatable chambers by means of seams 17 which interconnect the layers of fabric 11,12 within said inflatable region 14.

The present invention is not limited to the use of fabric, and the superimposed layers may be formed from another suitable flexible material, for example plastic foil.

5 At one end of the lower edge of the inflatable curtain 10, as shown in Figure 1, a protruding strap 18 is provided, the strap 18 being adapted to be connected to an anchoring point in a vehicle. At the other end of the lower edge of the inflatable curtain 10 a generally triangular extension 19 is provided which is also adapted to be connected to an anchoring point within the vehicle. The upper edge 20 of the inflatable curtain 10 is provided with a plurality of apertured mounting lugs 21 by means of which the inflatable curtain 10 may be mounted in position within a motor vehicle.

15 Extending adjacent the upper edge 20 of the inflatable curtain 10 there is provided an internal gas supply duct 22 of elongate form. The gas supply duct 22 is formed from a single element of fabric of elongate form which is folded about its axis so that the opposed side edges thereof are substantially superimposed. The side edges of the fabric of the gas supply duct are inserted between the super-imposed upper side edges of the fabric layers 11 and 12 of the inflatable curtain 10, and the four super-imposed edges are interconnected by stitching 23 (see Figure 2). The lower-most part of the gas-supply duct 22 is provided with apertures 24 which are provided in those parts of the gas-supply duct which extend across the inflatable regions 14, 15, 16 of the inflatable curtain 10.

25

In use of the inflatable curtain 10, gas is supplied through the gas-supply duct 22 which becomes inflated, and the gas passes through the apertures 24 formed in the gas supply duct 22 into the inflatable regions 14, 15, 16 to cause those regions of the inflatable curtain 10 to inflate.

Figure 3 illustrates the gas supply duct 22, which is provided with apertures 24, from the side, and from below. As mentioned above, the gas supply duct is of elongate form and therefore defines elongate axis 25.

5

Figure 3 illustrates an area 26 of the fabric forming the gas supply duct 22 which is illustrated at an enlarged scale in Figures 3a and 3b which show alternate embodiments of the inventions.

10

Looking initially at Figure 3a, the warp and weft yarns of the fabric forming the gas supply duct 22 are shown. It can be seen that one set of yarns (i.e. either the warp or weft yarns) are co-aligned with the axis 25 and the other set of yarns are 90° to the axis 25.

15

Figure 3b shows an alternative arrangement in which the warp and weft yarns each make an angle of approximately 45° with axis 25.

20

It is thus to be understood that the yarns forming the fabric that constitutes the gas supply duct 22 may have any orientation with reference to the axis of the gas supply duct 22.

25

Whilst the gas supply duct 22 described so far is formed from a single element of fabric which is folded and sewn by stitching 23 to form the tubular gas supply duct 22, gas supply ducts for use with the present invention may be formed as totally separate tubes or sleeves which are inserted into a pre-fabricated inflatable curtain.

As has been described above, if the yarns of the fabric are located so that one set of yarns are co-aligned with the axis 25 of the duct 22, the apertures 24

formed in the duct 22 may tear on inflation of the inflatable curtain 10. Alternatively, if the yarns are inclined at 45° to the axis 25 of the duct 22, should the gas supply duct 22 not be correctly positioned, the desired deformation of the fabric surrounding each aperture 24 may be blocked or restricted, for example by a dividing seam between two adjacent inflatable regions or chambers.

In embodiments of the present invention the fabric around at least one and preferably all of the gas outlet apertures 24 of the gas supply 22 are provided with a reinforcement to prevent tearing or deformation of the fabric surrounding the aperture.

Figure 4 illustrates an arrangement in which each aperture 24 within the gas supply duct 22 is provided with an annular reinforcing element 27 which is secured in position such that the central aperture of each annular element 27 is co-aligned with the respective aperture 24 formed in the fabric constituting the gas supply duct 22. Each annular element 27 may be mounted in position, for example, by the use of an adhesive, but may be secured in position using other techniques such as sonic welding.

20

Figure 5 illustrates a further embodiment of the invention wherein a single elongate reinforcing element 28 is provided, the element 28 having apertures 29 formed therein to be co-aligned with the apertures 24 formed in the fabric constituting the gas supply duct 22. Again the elongate reinforcing element 28 may be secured in position by means of an adhesive or using other techniques such as sonic welding. The reinforcing elements shown in Figures 4 and 5 may be of fabric or other suitable material.

25

Figure 6 illustrates a further embodiment of the invention wherein each aperture 24 in the gas supply duct 22 is provided with stitching 30 around its outer periphery, the stitching constituting the reinforcement.

- 5 In each of the arrangements shown in Figures 4, 5 and 6 each aperture 24 provided within the gas supply duct 22 is provided with a reinforcement which reinforces the periphery of the aperture, thereby helping to prevent deformation or unwanted fraying of fabric in the region of the apertures during deployment of the air-bag.

CLAIMS:

- 5 1. An air-bag, the air-bag defining at least one inflatable region, the air-bag being provided with a gas supply duct extending into the air-bag, the gas supply duct being formed of a flexible material and being provided with at least one aperture therein through which gas may flow into the said at least one inflatable region of the air-bag, the said at least one aperture being provided with a
10 reinforcement reinforcing the periphery of the aperture.
2. An air-bag according to Claim 1, wherein the flexible material comprises fabric or a plastic material.
- 15 3. An air-bag according to Claim 1 or Claim 2 wherein the gas supply duct is of an elongate form.
4. An air-bag according to any one of the preceding Claims, wherein the gas supply duct is provided with a plurality of said apertures, each aperture
20 being associated with a reinforcement.
5. An air-bag according to any one of the preceding Claims wherein the or each aperture is provided with a respective reinforcement.
- 25 6. An air-bag according to any one of the preceding Claims, wherein the or each the reinforcement is stitching provided in the fabric forming the gas supply duct.

7. An air-bag according to Claim 5 wherein the reinforcement for the or each aperture is a respective annular reinforcing element.
8. An air-bag according to Claim 4 wherein the reinforcement is a single
5 reinforcing element defining a plurality of apertures.
9. An air-bag according to any one of Claims 1 to 5 or 8 wherein the or each reinforcing element is adhered to the fabric.
- 10 10. An air-bag according to any one of the Claims 1 to 5, or 8 or 9 wherein the or each reinforcing element is formed of fabric.
11. An air-bag according to any of the preceding Claims wherein the air-bag defines a plurality of inflatable regions or chambers.
- 15 12. An air-bag according to Claim 11 wherein the air-bag is an inflatable curtain, the gas supply duct being positioned to supply gas to each of the inflatable regions or chambers.
- 20 13. An air-bag substantially as herein described with reference to and as shown in Figures 1 to 4 of the accompanying drawings.
14. An air-bag substantially as herein described with reference to and as shown in Figure 1 to 3 and Figure 5 of the accompanying drawings.
- 25 15. An air-bag substantially as herein described with reference to and as shown in Figures 1 to 3 and Figure 6 of the accompanying drawings.

16. Any novel feature or combination of features disclosed herein.

ABSTRACT:

5 "IMPROVEMENTS IN OR RELATING TO AN AIR-BAG"

An air-bag (10) is disclosed which defines at least one inflatable region (14). The air-bag (10) is provided with a gas supply duct (22) which extends into the
10 air-bag (10). The gas supply duct (22) is formed of fabric and is provided with at least one outlet aperture (24) therein through which gas may flow into the said at least one inflatable region 14 of the air-bag (10). The outlet aperture (24) is provided with a reinforcement to reinforce the periphery of the aperture (24) in order to prevent undesirable fraying of the fabric around the periphery
15 of the aperture (24), or undesirable deformation characteristics of the fabric around the periphery of the aperture (24), as the air-bag (10) is inflated.

Fig 1

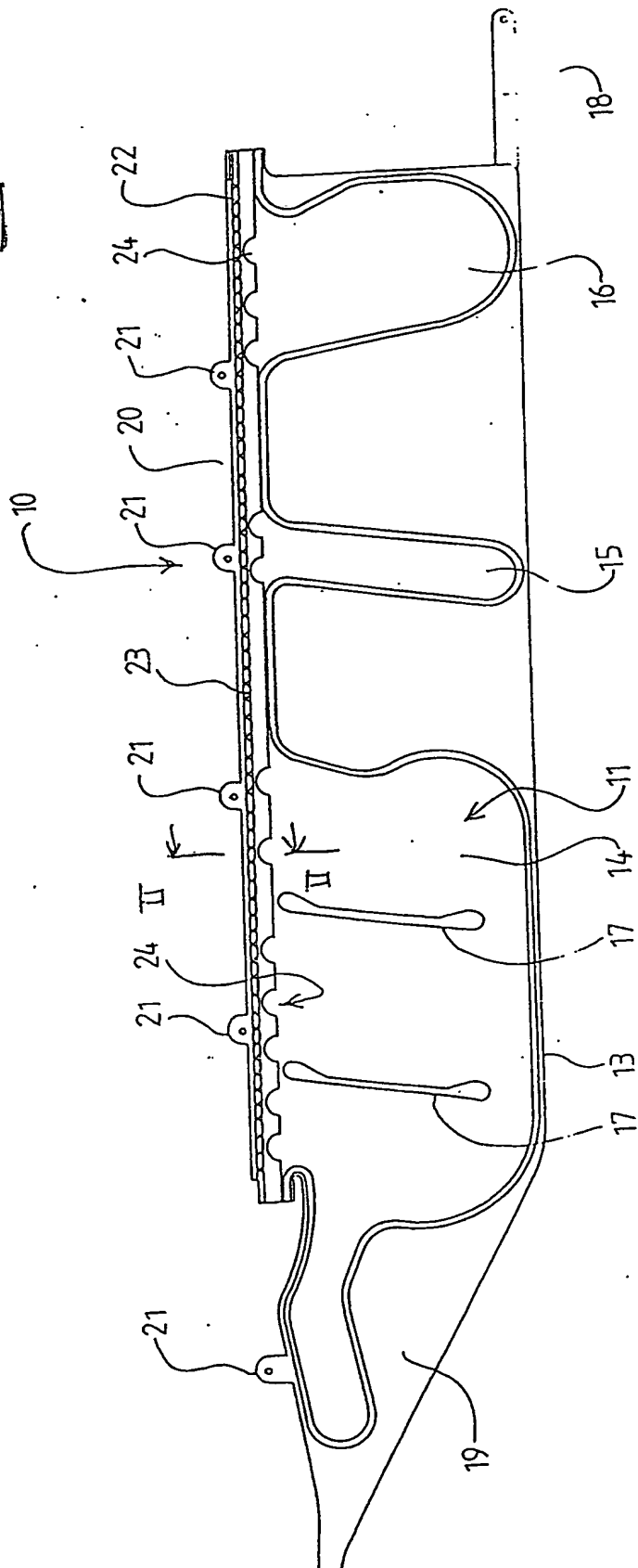


Fig 2

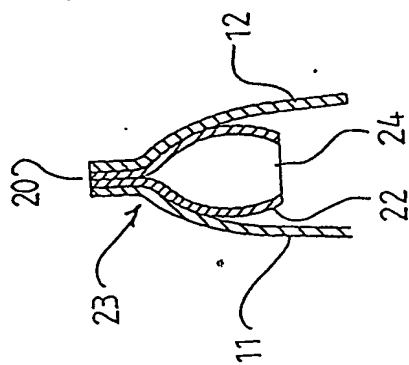


Fig. 3

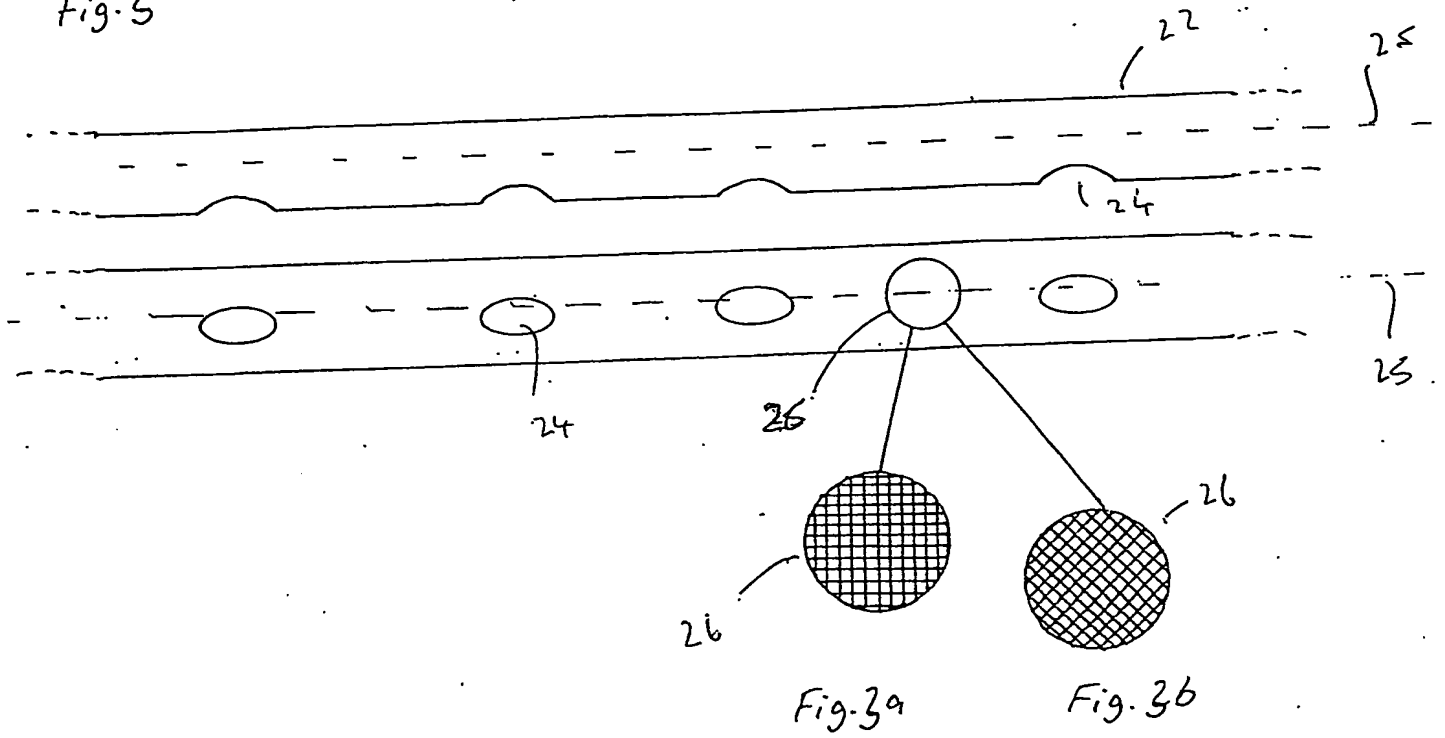


Fig. 4

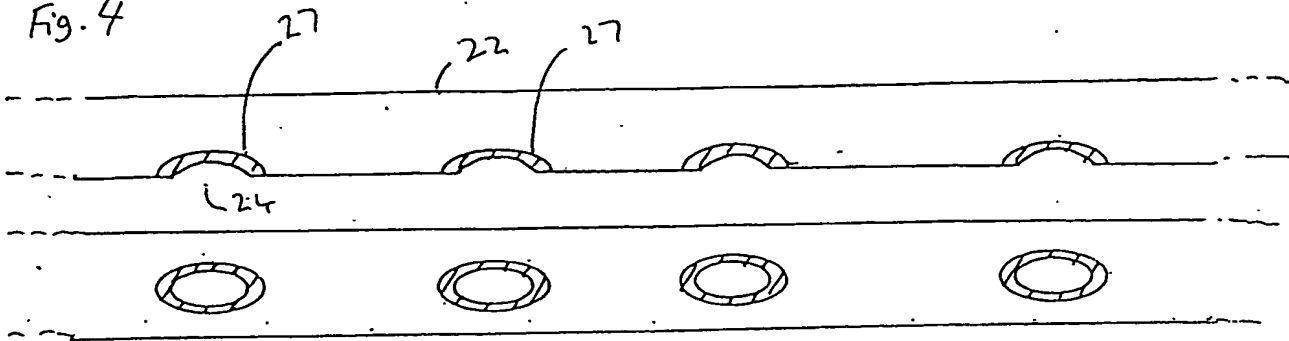


Fig. 5

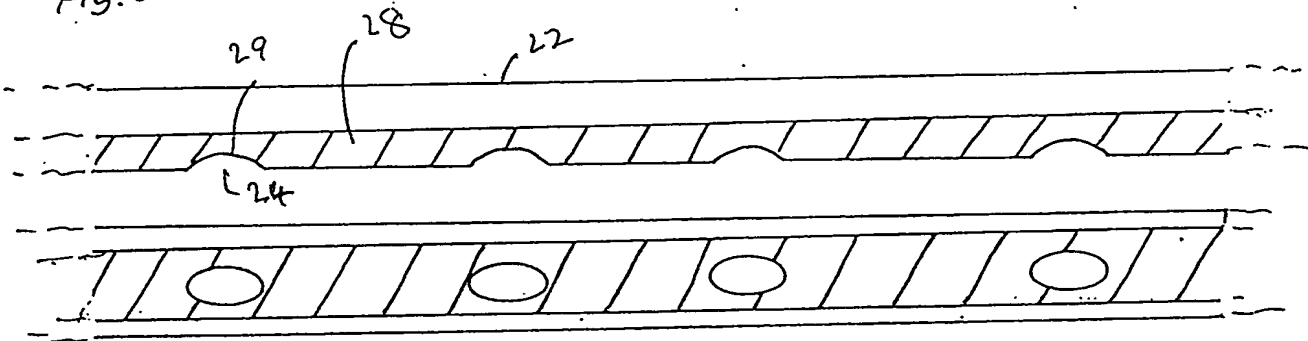


Fig. 6

